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ABSTRACT

This guide provides instructions for preventive maintenance and for making minor technical adjustments on microcomputers. General hints are provided for all microcomputers concerning static electricity reduction; use of dust covers; heat, magnetic fields, and floppy disks; and the use of halogen fire extinguishers. These are followed by troubleshooting suggestions specific to Apple computers and their peripherals, including the Macintosh, Apple IIc, Apple IIe, Apple IIGS, and the Image Writer II. (GL)

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# Troubleshooting Micro's

by

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## INTRODUCTION

Microcomputers are useful, productive tools for educators and schools alike. Computers provide an innovative way of saving time while maintaining accuracy for administrative chores and are a tremendous instructional resource for teachers when used properly. If a computer fails to perform for "technical" reasons, however, confusion and complaining often result. Many educators really do not know what is wrong with the machine nor how to repair it. The teacher or the school is subsequently left with a high repair bill.

A technician once told me that about 90 percent of his service calls were "user related." Most of what people refer to as "computer problems" were really the result of the users not knowing what to do, and many of his calls could have been solved by anyone with a little training, a little logic and a dash or two of common sense. He was increasing his family's standard of living by checking cable connections, cleaning disk drives, and replacing a few chips and an occasional circuit board...thank you very much.

Many times a minor technical adjustment could spare the individual or the district an expensive repair bill, and proper education on preventive maintenance could have avoided the situation altogether. There is also special technical training available to schools for computer contacts and other interested individuals. Ask your district's computer contact for additional information about vendor sponsored training courses.

The next few pages offer general suggestions, many which apply to all microcomputers. Hints and tips for specific computers are are also included. I hope they will help teachers and building principals avoid frustration and to help your school district avoid high cost repairs through proper equipment maintenance.

### Location, Movement and Training

The manner in which microcomputers are housed and maintained at the local school site directly relates to their successful use. There are two distinct approaches to this situation.

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Computer Lab One method is to house the majority of equipment together in the same location with good teacher supervision and security. The thought here is that computers are somewhat delicate pieces of equipment that should not be subjected to constant movement from location to location on carts, etc. Jolts and bumps over a period of time can cause drive alinement and disk speed problems. Many administrators feel that computer equipment housed under one roof with one qualified teacher or aide to maintain it and supervise its use will provide them many hours of trouble-free use.

Classroom Distribution Many schools and districts prefer to place computers in regular classrooms with individual teachers. These educators feel this gives the computer exposure to a larger number of students. Some schools or districts, however, are limited in the number of available units for use and have to place them on portable carts and transport them from room to room. This does subject the equipment to more potential problems, but teacher familiarity with the selected computer system and its proper preventive maintenance should reduce this problem to a point where it is not a major problem.

Either direction, classroom or lab, remains a local school or district decision. The key fact to keep in mind is either choice still mandates user awareness and knowledge of how to take care of each piece of computer equipment. The difference is in the number of people that need to be trained.

Each school in Polk County is asked to officially appoint their local computer guru or computer "WIZ" as the school's computer contact. The contact can act as a liaison between the district technology staff and the local school, and given a small portion of the school's inservice budget, he or she can be the local training resource to assist teachers within the school.

## GENERAL TECHNICAL INFORMATION

### Basic Guidelines

Static Electricity Many stories abound about static electricity and what it can or cannot do to a microcomputer or to disk drives. Some facts relative to static electricity, (or electrostatic discharge):

1. The smallest charge that you can
   a. feel is 3,000 volts.
   b. see is 5,000 volts.
   c. hear is 10,000 volts.
2. Many micro circuits are sensitive to as little as 500 volts of electrostatic discharge, which is 1/6 as little as one can feel.
3. A charge of static electricity can come from you, from your clothing (especially polyester), or from such common items as styrofoam cups or cellophane tape. You should never allow these items into the working environment, or wear polyester clothing while working on the inside of a computer.
4. Never touch anyone who is working on the inside of a microcomputer. You could transfer a static charge to them.
5. If the environment in which you keep your computers is producing a lot of static electricity problems, consider purchasing floor mats that are protective and insulating. These are available from various manufacturers, but can be quite expensive.

Dust Covers Use dust covers on all equipment not in use. Plastic garbage bags liberated from the custodial closet were not "elegant," but they saved 14 computers from a bath when a classroom roof leaked during a heavy rain.

In the event of...FIRE!!! Keep a HALOGEN fire extinguisher in the lab at all times to handle possible electrical fires. Halogen extinguishers do not "dust" the electrical components, rather, halogen extinguishers use a clean inert gas to deny oxygen to the fire and keep things cool.

Heat, Magnetic Fields, and Peanut Butter and Floppy Disks Use good quality diskettes. In general, any program that is to receive significant use should not be placed on the flip side of single-sided disk. This causes the "flippy" diskette to spin in the opposite direction and places dust, dirt, and trash back on the read-write head causing more frequent cleaning. Many people (including Apple Computer, Inc.) use a "flippy" for short start-up routines or for archive storage of data disks.

Do not place your diskettes on your monitor (or TV set), disk drive, or such devices as a graphics tablet. Their magnetic fields can erase or alter your media. Many pieces of office furniture are now built with magnetic latches. Remember that diskettes do not get along well with finger prints, fingers sticky with peanut butter, dirt or dust. One should never touch the exposed diskette surface and diskettes should always be stored in their jackets, in an appropriate container, and away from extremes of heat. Temperatures above 125°, such as are found in direct sunlight on a car's dash, will damage disks.

A word of warning about the 3.5 inch floppy disk. It is still subject to damage by heat. Don't let the hard plastic case and metal shutter fool you into thinking that 3.5 inch disks are "bullet proof". One of the 3.5 drives I explored had been fed a 3.5 inch disk that was warped 3/16ths of an inch from having been left in an automobile in the Florida heat. I still have the disk complete with plier marks which remain from attempts to remove the disk by brute force. After a few minor adjustments, the drive was returned to service and is still working. The moral is take care of the disks!!

Another problem that can aggravate 3.5" disk users is the metal shutter on some cheap disks which after time will get bent and catch inside the drive. If brute force is used to remove the disk, the danger is catching the tiny (read fragile) read/write head with the bent shutter and destroying the drive. If the floppy can be pushed back in and released either by using a large paper clip or a key stroke combination, the data can still be saved. If the usual tricks do not work, stop and have a technician remove the disk. That's still less expensive that the replacement cost for the whole disk drive. Remove the bent shutter completely, reload the disk and immediately copy the data to another disk. Then discard the unprotected 3.5" disk.

## TROUBLESHOOTING...ON YOUR OWN

### At the First Sign of Trouble

First Test on Apple II Computers Remember, the caps lock key must be in the down position to properly use many of the early pieces of Apple software.

While speaking of keys, if a key breaks, save the key cap. The individual key mechanism can be replaced. If glue or epoxy is used in an attempt to patch a key, the eventual permanent repair will require a new key cap...usually available only in complete sets!

Some programs or upgrades require an "enhanced" IIe. To check to see if the system is in fact a IIe enhanced, boot the system. If you see "//e" on the screen, the system is enhanced. If "][e" is displayed, the computer is "unenhanced".

System Configuration Know the system's configuration -- what it takes to hook the computer system together. Many times a "broken" computer is simply not properly connected to its interfaces. Check cable connections, dip switch settings, and installation or set-up routines for the specific machine. A few of the common Apple dip switch settings have been included in this guide. Check your computer or printer manuals for additional information.

The normal interface slots for peripheral devices to be connected to the Apple IIe are as follows:

Slot 1 - Printer
Slot 2 - Modem
Slot 4 or 5 - 3.5 Disk (if added)
Slot 6 - Disk Drives (Look at the numbers. It is still possible to find disk controller cards in slot 7 in Apple computers that aren't working very well.)

**THREE TESTS TO PERFORM WHEN YOUR COMPUTER STOPS WORKING**

1. Check the cables.
2. Check the cables.
3. Check the cables.

Thanks and a flip of the disk to:
Jeff Lake, Illinois Vocational Curriculum Center, Sangamon State Univ. Springfield, IL 62708

## Check the Power Cables

First, Check the Obvious Is the computer's power cable plugged into the wall outlet? Check both ends of the power cable...and the "on" switch. Will the monitor turn on?

Surge Protection Invest in a good surge protection power bar or internal surge protection for your computer systems. Remember the only real protection against lightning is to unplug your system when not in use or during electrical storms. Surge protectors are only for those instances when lightning strikes some distance away, or there is an unexpected surge when a piece of equipment is suddenly turned on. There are no surge protectors that will protect computer equipment under all circumstances. A direct hit by lightning is just beyond the scope of most surge protectors.

Lightning will also follow telephone lines into a computer system. A lightning strike two buildings distant found a phone line, wiped out the modem, entered the computer through the modem's serial port, and wiped out three chips before being dissipated. The surge protector had been pulled from the socket when the storm started, but the operator forgot to pull the phone plug.

Extension Cords Do not use common household-type extension cords or electrical outlet expanders to "jury rig" power to your system. At least use good quality surge protected multiple outlets. Try to have electrical lines for power to a lab that are separate, grounded circuits, not connected to the lights of the room, etc. I once saw a computer connected on a single multiple outlet with an overhead projector, a 35mm slide projector, and a printer and the room lights on the same circuit. The old circuit breaker located down the hall couldn't take it either and was eventually replaced... but not before the teacher learned to frequently "Open Apple - S" to save the data to disk.

On or Off"? Frequently, new computer users ask if they should leave the computer on all day long, or turn the computer off when not in use. According to the experts, switching the computer on in the morning and leaving it on all day will cause less stress on solder joints and electronic components than frequently turning the machine on and off. I know of some networked computers that are on protected circuits that are turned off only for system or program maintenance. They run for weeks and months at a time with no apparent ill effects.

Monitors, on the other hand, will "burn in" if left on all the time. It's O.K. to turn the monitor off, or dim the screen when the computer is not in use. It also keeps the screen from distracting students while I explain a lesson. I have one of several programs rigged on each of my own computers which turns off the screen when the computer is not used for two minutes. As soon as I hit a key, the monitor turns back on. Several such programs are available. They certainly save the little screen phosphors.

The Apple IIe will, at times, display "computer garbage" on the screen if switched on and off too quickly. To a new computer user, this normally results in a reaction similar to heart failure...tightness in the chest, lump in throat. Should this occur, turn the computer off, wait 10 seconds (count), then turn it on again. "There, doesn't that feel better now?"

Self - Test The Apple IIe has a built-in self test that can be run by depressing the closed (solid white or solid black) apple key together with the control and reset keys. After several visual displays on the monitor, the message of "Kernel OK" or "System OK" will appear on the screen, or a specific error message with the location of the chip problem on the motherboard. Write down the error message and save it for the repair technician. If you have one of the new "battleship grey" IIe's with a built-in numeric key pad, use "Control, Option, Reset". Many IIe motherboard problems are directly related to the failure of one of its eight 64K 150NS ram chips. The IIe self test (Control-Solid Apple-Reset) will identify a defective ram chip most of the time.

If You Lift the Lid It may sound silly, but make sure the computer is turned off before pulling chips, interface cards, or cables. Some manufacturers unwittingly provided an audible signal with their fan motor to remind teachers the computer was still powered on. Apple has a red light emitting diode (LED) next to the power supply on the rear of the mother board to remind "would-be" technicians if the circuit is still hot. IF YOU CAN SEE THE RED LIGHT, STOP and TURN THE COMPUTER OFF! Pulling a card with the power still on can push a 12 volt surge of electricity through a circuit designed for .03 volts and will blow a chip on the card itself or on the logic board of the attached interface item. With the Disk II, for example, it can blow chip 74LS125 and cause the drive to erase any software booted from it. It can also blow one or more chips on the motherboard, or other chips on the Disk II analog board (the circuit board above the disk drive).

Remember static electricity. If you decide to look inside the computer, never touch anything on the inside of the IIe until you have grounded yourself by touching the power supply (it is grounded metal). Leave the computer plugged into the wall to maintain a good ground on the power supply. Remember that if you pick up and replace your foot after doing this you can regain a charge of static electricity. The best ground is a wrist strap ground [available at Radio Shack, Part Nr. 276-2399 - $1.99].

It's All in the Cards...Sometimes. Never touch the metal fingers (contacts) of the interface cards as dirt or oil from your hand could cause a poor connection. I had always heard that a pencil eraser could be used to clean contacts that had become corroded. However, if I suspect the contacts on a card problem, I try removing and reinserting the card once or twice. The contacts will usually reestablish the connections themselves. If removal and replacement does not reestablish contact, use a liquid contact cleaner and a clean cloth. Don't use the eraser from your kid brother's pencil.

Apple (and IBM) ship the interface cards in a protective antistatic plastic envelope. The card should remain in the envelope until ready for installation, and should be put back in the envelope or in a similar protective envelope or bag if removed. Remember static electricity?

Check the Monitor Cables and the Monitor

The cables occasionally get loose or a student will loosen the cable at the monitor or the computer end. The monitor begins to look out of focus and colors fade. Before panic sets in, check the connections. If the connector is loose, the outer portion of the connector may be gently tightened with a pair of pliers.

Radio Shack's 36" Shielded HiFi Cable (Part # 42-2366 Cost: $1.89) which is a shielded wire with an RCA Phono Plug at both ends can be substituted for Apple Monitor II cable (Part # 590-0025 Cost: $8.00). The Apple supplied cable is well engineered. The Radio Shack part will work.

Before anyone declares the monitor dead, also check to see if the brightness and other controls have been twisted out of normal range. The monochrome controls are on the back panel of the monochrome monitor. The color monitor controls are beneath a front panel.

The new color monitors for the Apple IIe and IIc have a switch that allows them to use color for 40 column programs and monochrome for 80 column text and spreadsheets. The owners of the older composite color monitors are not so lucky.

WARNING - Don't Play Around Inside Monitors! The cathode ray tube (CRT) display that many computers use is in reality a large glass envelope with all the air removed. If the glass of the small end of the tube is broken by any means, the resultant glass pieces will be forced inside and will bounce off of the inner walls of the tube with tremendous force that will then propel a shower of glass particles outward. This is known as an implosion and is extremely dangerous to the eyes. The front of a CRT has a safety glass shield to protect you from this danger.

The second danger is from the anode, an electrical connection on the bell shaped portion of the monitor. The wire leading to the anode is about the thickness of a spark plug wire on an automobile engine, and has a thick rubber cover. The stored energy even after the monitor is disconnected can exceed 12,000 volts.

In fact, some manufacturers do not recommend any user maintenance of monitors due to these two dangers. IBM, for example, suggests that all its monochrome monitors be repaired by their own trained technicians. Even the vertical hold adjustment is inside the case with no provision for reaching the control from the outside. Other manufacturers at least provide access to the common monitor controls and adjustments outside the case. If the controls are available, feel free to adjust the controls. Just don't take the monitor apart!

Check the Cables to the Disk Drive(s) and Check the Drive(s)

Poor or improper connections between the disk drives and their interface cards or cables at any point will cause erratic behavior of the drive, possible blown chips on the drive analog board or the interface card and erase the software again.

Only about five things can happen to a disk drive.

1. The drive will not boot at all (always an operator aggravation).
2. The drive will neither read nor write (and it may get aggravated enough to munch the only copy of your favorite disk).
3. The drive doesn't want to read.
4. The drive doesn't want to write.
5. The drive writes on a protected disk over the only copy of your favorite program.

With two Disk II's connected to the same interface card, a problem with the logic card of the second disk drive (connected to the Drive 2 outlet) can cause the first drive not to load properly. Check each drive independently. If both drives act up, check the interface card by trying a "known good" drive interface card.

At this point, I usually suggest the owner check the errant disk drive with a copy of MECC's Computer Inspector or Computer Checkup (formerly XPS Diagnostics). Both Computer Inspector and Computer Checkup have a quick drive test procedure. The Computer Checkup manufacturer suggests using a write protect tab on the original diskette and the use of a separate "test diskette." It is only a minor aggravation that the disks cannot be backed up by "ordinary means." Just be sure you use a backup copy of the diagnostics (or the so-called "test disk") in the event the drive takes a lunch break and decides to eat the data on the diagnostic disk. Computer Inspector requires the use of a "scratch disk" or "test disk," but overall the MECC diagnostics disk is easier to use.

NOTE - Computer Inspector is a new diagnostic product from MECC (3490 Lexington Ave. North, St. Paul, MN 55126) which provides simple, easy to use checks for teachers to use with Apple II computers. The disk covers 48K Apple ][s up to Apple IIGS machines. Computer Inspector is available in 3.5 and 5.25 inch formats for $59.00.

Power Up (P.O. Box 7600 San Mateo, CA 94403) markets Computer Checkup (advertised price $59.95). According to AppleLink's database, versions of Computer Checkup are still available for the Apple II, II Plus, IIc and IIe. However, the program is not listed in the current Power Up catalog. The program is copy protected, as was XPS Diagnostics, but a card is included with the manual and disk that allows a backup copy of the original disk to be purchased for $6.00.

Defensive Disk Driving Clean the read-write heads of your own disk drives and check the disk speed every three to four months or every 40 hours of use (even more frequently if the environment is dusty). If your district has a maintenance contract or district repair service, check to see what's included before tearing into a school disk drive.

1. Use denatured 90% alcohol and foam or chamois tipped swabs on older "take-apart" type drives such as the Disk II. (Cotton tipped swabs will leave lint on the heads.) The newer Apple disk drives are more difficult to disassemble and the use of a cleaning disk is being recommended. Be sure to follow the directions furnished with the disk drive cleaning kit for your particular machine. For example, Apple IIc and IIe drives are single sided - only one side of the cleaning disk is exposed. The top side of the cleaning disk is usually not exposed to protect the felt pad that holds the floppy disk against the read-write head. Late model IBM drives have two read-write heads per drive and both sides of the cleaning disk are exposed. Follow the directions carefully. Pay particular attention to directions about single sided and double sided drives! When set up for cleaning, the cleaning disks are similar but not the same.

2. Very erratic D-speed can often be helped by a good cleaning. Clean the read-write arms of the older "take-apart" drives with alcohol or head cleaner at each cleaning - particularly if the drive happens to be used by a heavy smoker [it can't possibly hurt the drive as much as the smoker - Ed]. Do not use oil anywhere inside the drive - even if it does squeak!! Neither WD-40 nor Valvoline 20W50 Racing Oil will cure anything in a disk drive.

3. Set D-speed to proper specs with purchased software or use the strobe method outlined in several books. Apple's new Unidisk and the older, no-longer manufactured Duodisk have a hole in the bottom of the cover just like the Apple IIc to provide access to the disk speed adjustment screw. This allows adjustment using a tiny screwdriver and an adjustment utility disk. Using "protected" software, D-speed frequently needs to be in the 0 to -5 range.

4. On older single sided drives such as Apple Disk II, rotate the felt pressure pad if it will turn and replace the felt pad if it is very worn.

5. Smoking around your disk drive can contaminate the drive arms (the shiny rods upon which the read-write heads move back and forth) and the read-write head. In general, do not blow smoke directly into the disk drive slot at close range. Suspect anyone who says otherwise to be an anti-smoking fanatic. I would worry more about dust from carpets.

**800K 3.5" DISK DRIVE COMPATIBILITY**

| DRIVE | IIe | IIc | IIGS | Mac 128/512/ 512E/Mac Plus | Mac SE | Macintosh II |
|---|---|---|---|---|---|---|
| Unidisk 3.5 (white case) | X | X | X | | | External disk |
| Apple 3.5 (platinum case) | | | X | | X | drives not |
| Mac 800K Ext. (beige) | | | | X except 128 | | supported. |

From Apple Technical Support East, "Technical Tidbits", July 31, 1987.

If the drive fails the test and cleaning the read-write head and setting D-speed fail to correct the problem, you may proceed to go into chip replacement (at your own risk), call your district's repair technicians, or take the drive to the nearest educational dealer.

## OTHER MODELS - OTHER SUGGESTIONS

### Apple IIc

The little Apple IIc will do everything the normal IIe will do in a smaller package. The drawback to the IIc is adding extra interface cards. For example, a IIc with a second disk drive, new color monitor, and an ImageWriter II printer is a super rig for most applications. However, don't plan to upgrade the IIc with a MIDI music interface, or add a coprocessor card with a newer, faster CPU chip. In fact, leave the inside work to an Apple technician. It's crowded inside the little case.

The thin disk drive built into the IIc allows external adjustment and use of a cleaning disk is suggested to clean the read-write heads.

When the IIc was first released, some IIe programs would not run on the IIc. For the most part, the current IIe enhanced and IIc programs are running fine. If you happen to encounter a program that will not run correctly on your computer, check the box or the user's manual. The documentation should clearly indicate if the program is for a specific computer, IIe or IIc. Most of the older II+ programs will run on anything that electrically looks like an Apple.

The new Apple C+ is a better than average little speed-demon that comes with a 3.5" drive instead of the 5.25" drive. To slow the machine down so that Flight Simulator doesn't look like the Starship Enterprise at warp speed, hold down the escape key before you press Command-Control-Reset. Release the reset key, then release the escape key after you see the word "NORMAL" on the monitor. Then release the other keys.

Apple IIGS

A couple of observations are in order.

1. The IIGS carries a lot of graphics as "overhead" and loads from 3.5" or 5.25" disks just as always. Therefore, it appears to be slow [It is slow! - Ed.] but considering all the color graphics, the little CPU is working hard. It works even better from an HD20SC and supports AppleTalk networking.
2. The sound chip (15 voices) has to be heard. It may take a music major or a foreign language teacher to truly understand the potential.
3. Many of the features that used to require extra cards are built into the IIGS motherboard. That means that slots are available for video boards to capture images from a TV camera, or MIDI boards to load keyboard input, or CD ROM when that technology catches up. There is room for expansion. There is even room and a connector for (gasp!) a fan.
4. From what I've seen, it appears to be a well made computer and thought was given to making it easy to repair.

Installation and Set Up The installation is easy if left to the "installing dealer," but in the spirit of adventure, only a few things present a challenge to the new owner. For example, which is the "boot drive"? The school solution seems to be to hook the 3.5" drive to the computer, and daisy-chain the 5.25" drive into the back of the smaller drive. The control panel program allows a set up to scan the drives on start-up. The IIGS boots from almost any combination I've tried.

The Control Panel The manual directs the new owner to hold down the option key and turn on the computer to access the control program. I never did get that method to work. The friendly technician at the local Apple store provided the first clue. Hold down the Command (Open Apple) and the Control Keys, then press Escape. Now you can get to the Control Program to adjust the sound levels of the Bose speakers!

According to Apple Service Training's symptom chart, the control panel seems to be the key to proper setup and operation of the IIGS. If the display is "fuzzy" with a good monitor, check the control panel video setting. If the computer won't boot from a known-good disk drive, check the control panel settings for correct slot assignments. If the keyboard seems to print characters on the screen known only to a foreign exchange student, check the control panel for the correct language setting. The modem doesn't work? The printer hasn't printed? Check the control panel for the proper settings. No sound - too much sound? Right! Check the control panel for volume level and tone. Are your programs crashing faster than Flight Simulator? Check the control panel for speed - normal or fast.

The control panel also adjusts the color for AppleWorks if the RGB color monitor is used. Experiment until you find the combination you like.

While on the subject of the control panel, you can still use your old printer and cable with the new IIGS if you use your old super serial card. Put the card in slot 1 just as always. Twist the metal spring lock to uncover an opening for the cable connector, and install the ribbon cable and connector. Don't test the printer just yet. The computer still thinks it's working off the serial connector on the motherboard until you change the control program. Enter the Control Panel (as above) and set slot 1 for "your card". (No check mark appears to be normal when "your card" is selected.) Then, power off, wait a few seconds, and turn the computer back on. Now everything should work with your old card, cable, and printer.

Why turn the computer off? The control panel apparently resets a static RAM chip which then acts just like a dip switch when the computer is turned on. The only time the computer reads the setting is when it is turned on.

I've often wanted to know who was responsible for some of the things that have happened in education. I thought it was evidence of pride in their craftsmanship that the names of the developers of the Macintosh are still embossed on the inside of the computer's case. The IIGS has a similar trick. Turn on the IIGS with no disk in the drive. After the "Check Startup Device" message appears, press the Command, Option, Control and N keys to see the names of the developers.

AppleWorks 2.0 is set to load into the available RAM. If you order a RAM card, read and follow the directions furnished. The trick will be to remember where you put the jumpers that are furnished with an "unpopulated" card on the day you decide to add the extra RAM chips needed to fill up the sockets on the card. The jumpers are marked "J1" and "J2". No jumpers are required for the 256K configuration. J2 must be installed to see 512K on the card. J1 and J2 are required for the computer to see 1MB of memory. HINT - Save and mark the plastic bag containing the jumpers.

## PRINTERS AND RIBBONS

The ImageWriter II uses the same ribbon as the older ImageWriters for black and white printing, but four color ribbons are available, if somewhat expensive. The sum total of negative experiences is shown below:

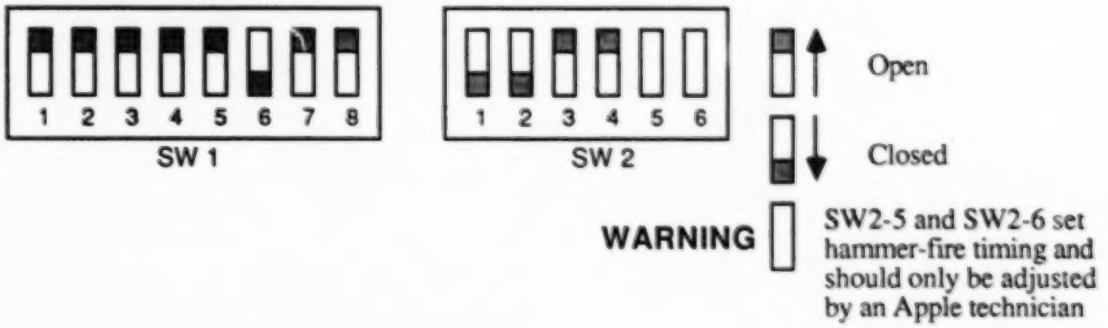
1. The cover has a magnet that prevents the printer from printing in the presence of children's fingers. Handy thing to have in a classroom. However, the printer will not work without the cover being correctly positioned. If your printer suddenly doesn't print, check the cover.
2. The new "pusher" tractor rolls the crease in the paper under the two black rollers above the print head just as the top line on the page is printing. The characters may be shorter than normal. Some continuous paper seems worse about that trick than others. I have used a few "#2 Boston Clips" to pull on the leading sheet of paper when it was a problem.
3. I have not yet found a printer proof 1" x 4" address label. If the printer driver or the software (or the user) attempts to back up to save a label or two, the user risks peeling a label off inside the printer. The last label I removed was located directly under the large rubber platen and glued to the smooth black plastic guides. It took about an hour and a half worth of aggravation and several cc's of alcohol to remove the glue from the guides so that paper would again feed through the printer.

Keep your printer clean and use good quality replacements when print type is faded or the original ribbon breaks. Do not attempt to restore a ribbon with stamp pad ink or with home remedies such as WD-40. If you dirty the print head it will require a thorough cleaning if not replacement.

Having a printer problem? Always check the dip switch settings on the Apple IIe's super serial card and related interface devices (printers and modems) to be sure they are accurate before you send an Apple computer or printer back for repair. Then check the cable connectors to make sure they are clean and tight (push in and out a couple of times and then retighten the screws). See the diagrams in this handout for suggested configurations.

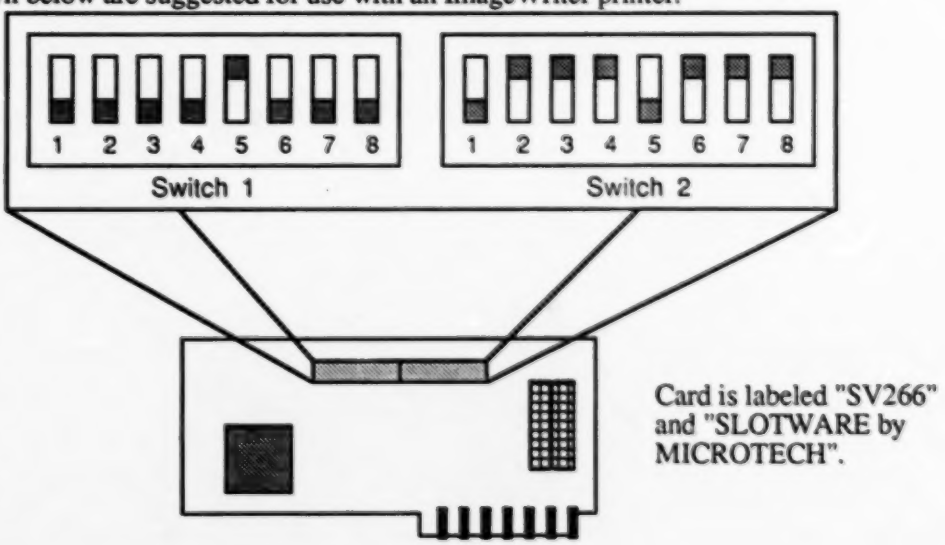
ImageWriter II Dip Switch Settings

The switch settings shown below are the standard, "as delivered" settings for the ImageWriter II.

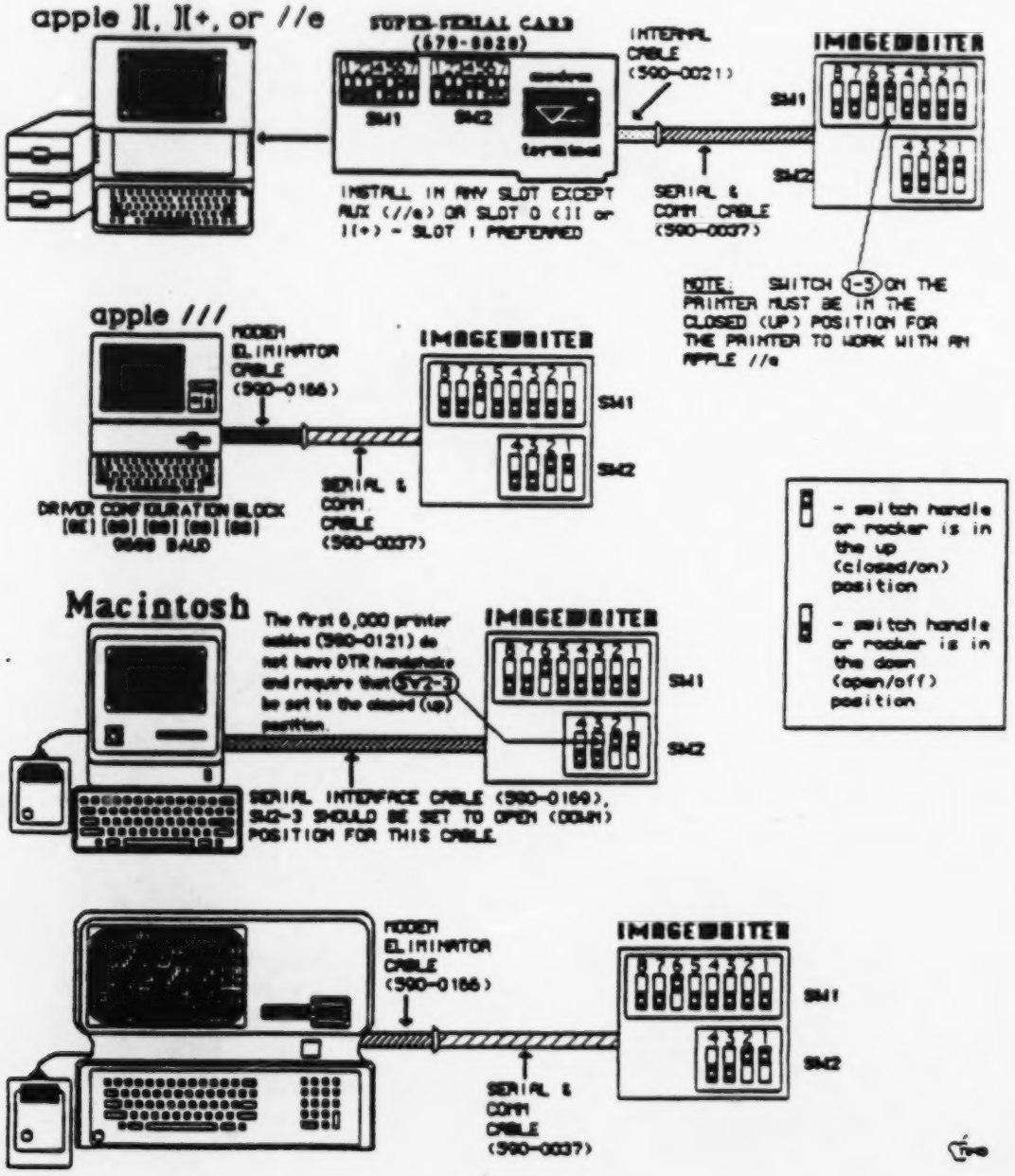

1 2 3 4 5 6 7 8
SW 1
1 2 3 4 5 6
SW 2
Open
Closed
WARNING
SW2-5 and SW2-6 set hammer-fire timing and should only be adjusted by an Apple technician

Switch Settings for Microtech Serial Card

Several Polk County Schools have Microtech serial cards instead of Super Serial Cards. The settings shown below are suggested for use with an ImageWriter printer.



# Imagewriter Configuration


apple II, II+, or //e
SUPER SERIAL CARD
(670-0020)
SW1
SW2
INTERNAL CABLE (590-0021)
IMAGEWRITER
SW1
SW2
INSTALL IN ANY SLOT EXCEPT AUX (//e) OR SLOT 0 (II or II+) - SLOT 1 PREFERRED
SERIAL & COMM CABLE (590-0037)
NOTE: SWITCH 1-5 ON THE PRINTER MUST BE IN THE CLOSED (UP) POSITION FOR THE PRINTER TO WORK WITH AN APPLE //e
apple ///
MODEM ELIMINATOR CABLE (590-0186)
IMAGEWRITER
SW1
SW2
SERIAL & COMM CABLE (590-0037)
DRIVER CONFIGURATION BLOCK
9600 BAUD
- switch handle or rocker is in the up (closed/on) position
- switch handle or rocker is in the down (open/off) position
Macintosh
The first 6,000 printer cables (590-0121) do not have DTR handshake and require that SW2-3 be set to the closed (up) position.
IMAGEWRITER
SW1
SW2
SERIAL INTERFACE CABLE (590-0169), SW2-3 SHOULD BE SET TO OPEN (DOWN) POSITION FOR THIS CABLE
MODEM ELIMINATOR CABLE (590-0186)
IMAGEWRITER
SW1
SW2
SERIAL & COMM CABLE (590-0037)